St. Louis Demolition Study:
An Environmental Public Health Tracking Linkage Project

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White Paper

I. Introduction

The success of public health efforts in the United States is partly dependent upon the successful collaboration of the various components of the public health system. Partnerships between public health practitioners and academic researchers facilitate a synthesis of distinct but complimentary resources. Each of these entities brings unique benefits to the partnership. Local and state public health practitioners are in a position to provide an assessment of public health needs from a hands-on perspective, established relationships with other governmental agencies, access to an often rich repository of data, and a mandate to use the data to create an environment in which human health is protected. Academic researchers contribute a theoretical approach to public health problems and solutions, as well as high-level technical and analytical expertise. Combining the unique strengths of these two components of the public health system has the potential for greater impact on the public's health than the contribution of either entity alone. Unfortunately, there is no blueprint for how to implement or execute such a partnership.

In 1988, the Institute of Medicine issued a report on the Future of Public Health,[1] in which the authors identified the need for academia and public health practitioners to benefit from each other's insights. Since the report was published, several research and opinion papers have addressed the need for synergy between these entities, and some have attempted to identify the issues associated with achieving collaborative partnerships. Margolis and Runyan identified barriers to collaborative efforts between academia, public agencies, and community groups, including differing approaches to defining problems and solutions, distinct career values and work styles, dissimilar demands on their time, and differences in approaches to using information.[2] Lancaster identified four "gaps" between research and practice that hinder effective collaboration[3]. A "communication gap" inhibits collaboration by limiting the ability of the parties to agree on the identification and definitions of problems and solutions; an "access gap" describes the situation whereby certain practitioners have limited access to schools of public health; a "credibility gap" refers to the situation in which differing institutional principles cause one party to underestimate the value of the contributions of the other; and the "expectation gap" which can be seen as the break-down between the practical implications of public health and the rigorous demands of science.

Efforts to promote successful collaboration are aimed at overcoming these barriers. The success of public health practitioner-academic collaborations often hinges on the ability of the participants to adapt to a specific situation. Nonetheless, there are general issues that can be addressed to foster the development, implementation, and execution of successful partnerships. Doll, et.al. describe two successful collaborations that are built on "guiding principles" such as (a) a commitment to contribute to public health, (b) a commitment to partnership, (c) open and regular communication, (d) compatibility in goals and work styles, (e) building consensus, and (f) giving appropriate credit."[4] In general, partnerships are facilitated by achieving "buy-in" between the participants regarding the definition of the problem, as well as the approach to solve the problem; establishing trust; achieving an understanding of the institutional differences in social, political, and operational climates; and clearly stating the objectives of collaboration and the roles, responsibilities, and risks assumed by each partner.

The Centers for Disease Control and Prevention (CDC) has taken the lead on promoting collaboration between academia, public health practitioners, and community groups, with its Prevention Research Center (PRC) program. This program supports projects aimed at integrating the resources unique to each stakeholder in an effort to maximize the benefit to public health. In addition to the PRC program, other programs at CDC require the development of partnerships between components of the public health system. One such program is the Environmental Public Health Tracking Network (EPHTN).

II. Background: The Environmental Public Health Tracking Network

Environmental Public Health Tracking Network (EPHTN) is a Centers for Disease Control and Prevention (CDC) effort to improve the health of communities through the establishment of a network to collect, integrate, track and link environmental data and human health effects.[5] EPHT was developed in response to recommendations by the Pew Environmental Health Commission in a report entitled *America's Environmental Health Gap: Why the Country Needs a Nationwide Health Tracking Network*.[6] This seminal work describes the lack of adequate information systems to investigate links between the environment and chronic diseases. It describes the current state of data systems as separated by organizational structure and data collection procedures.

In 2002, the CDC funded the EPHT network to collect data on possible environmental hazards, exposures, and human health effects from multiple sources and to integrate them into a data system that would allow linking the data to investigate purported relationships between public health and the environment. Since 2002, CDC has supported 24 state and local health departments and four Academic Partners of Excellence (APEX). The APEX are responsible for providing expertise and support to state and local health agencies to develop the EPHT network. As a result, mutually beneficial relationships have developed between the academic centers and many of the local/state health departments. These relationships are demonstrated in data linkage projects and epidemiological studies jointly undertaken by academic APEXs with their state partners. The state/academic partnership is a novel approach for the amplification of efforts in this important area of research.

Currently, EPHT projects involve a myriad of health issues including possible adverse effects of pesticide use, air pollution, and metals exposure, among others. This paper describes the process and issues associated with a collaborative effort between state and local governmental health agencies in Missouri and researchers from Tulane University in New Orleans to explore the impact of building demolitions on children's blood lead levels in St. Louis City.

III. Project Overview

Despite the steep decline in children's blood lead levels in the past three decades, lead poisoning remains a major environmental health problem in children in the United States. Nationwide, it is estimated that 310,000 children have elevated blood lead levels (EBLs).[7] In Missouri, prevalence rates for children with an EBL have mirrored the national trend declining from 14% in 1997 to 4% in 2003.[8]

St. Louis City, Missouri is similar to many other large urban areas that continue to have a significant number of children with EBLs. Childhood blood lead testing data in 2003 indicate that 63% of the children in Missouri with a blood lead level ≥ 10 μg/dl live in St. Louis City, however, St. Louis City contributes only 6% of the childhood population of the state. U.S. Census data reveal that 94% of the housing stock in St. Louis was built prior to 1979 with the median year built being 1941.[9] The home environment, specifically housing built prior to 1978, has been shown to be the primary lead exposure source for urban children. Urban renewal efforts are a priority for many of America's inner cities. As efforts to reconstitute urban centers increase, the demolition of deteriorated structures has accelerated.

From 2001 to 2002, St. Louis City issued permits for the demolition of more than 2,000 structures. Research has shown that ambient lead dust dispersed from building demolitions may be a health risk.[10] Further, Farfel et al found that within 10 meters of a demolition site, ambient dust lead levels rise.[11] In another study, significant lead and dust loadings were measured within 100 meters of demolition sites.[12]

Given the level of demolition activity in St. Louis City and the hazardous nature of the buildings being demolished, the Missouri Department of Health and Senior Services – Office of Surveillance conducted a study to examine the correlation between EBLs and demolition activity. Data from the Missouri Childhood Lead Poisoning Prevention Program (CLPPP) were merged with data from the City of St. Louis Building Division to compare areas of the city with the greatest density of demolitions to areas of the city with the greatest density of elevated blood lead levels (defined as ≥ 10 μg/dl). This effort identified several "hot spots" throughout the city, areas that warranted additional study.

The Missouri Department of Health and Senior Services (DHSS) requested assistance from the Tulane University APEX to investigate the relationship between demolition activity and childhood blood lead levels in the City of St. Louis. Tulane designed an epidemiological study using routinely collected data to examine whether children

exposed to demolition(s) are more likely to have higher blood lead (BPb) levels than children not exposed to demolition activity controlling for other known risk factors for an elevated lead level.

To complete the study, four separate databases were needed; the City of St. Louis Childhood Lead Poisoning Prevention Program (CLPPP) lead surveillance data, the City of St. Louis Building Division Demolitions database, the US Census data files and the City of St. Louis Tax Assessor database. These datasets came from a variety of governmental sources. The datasets' primary uses were diverse, with only the childhood lead database collected primarily for health purposes.

Access to these data sources is restricted and metadata was often unavailable. Therefore, to obtain access to the data, efficiently utilize the data, and ensure that the results of the study would be considered by relevant policy makers, it was necessary to build partnerships between the Missouri Department of Health and Senior Services, their academic partner Tulane University, and representatives from several governmental agencies, at both the state (Missouri) and city (St. Louis) level.

IV. Building Partnerships

Missouri / Tulane Partnership

The initial partnership between the Missouri DHSS and Tulane researchers was established because of the organizational structure of EPHTN which dictated that each funded state be assigned an academic partner. The EPHTN framework facilitated the development of partnerships between state and academic partners. Without this framework, the partnership would have been more difficult to build. An institutional framework that supports partnerships is not however, in and of itself, sufficient to guarantee that meaningful relationships will be established. A desire to advance public health in the area of childhood lead poisoning was a mutually shared commitment.

After identifying that demolition activity may be an unrecognized lead exposure source, Missouri enlisted the support of Tulane researchers to assist them with continued study into the relationship between demolition activity and children's lead levels. From Tulane's perspective, the decision to pursue this relationship was motivated by a mutual interest in childhood lead, coupled with the belief that partnering with Missouri would provide access to unique and useful datasets, as well as assistance with data utilization issues when they arose. In return, Tulane would provide methodological expertise, both epidemiological and biostatistical, in carrying out the study. Finally, a commitment to open and frequent communication cemented the partnership and allowed the parties to build a consensus on individual roles and responsibilities, as well as a cohesive vision of the goals of the collaboration. This final component of the partnership focused on striking a balance between the need for scientific rigor and the need to provide a product that could be translated easily into public health practice.

Missouri State and City Partnership

In 1993, the Missouri DHSS was awarded funding from CDC to create a childhood lead poisoning prevention program. DHSS sub-contracted with the City of St. Louis Department of Health to provide data entry of blood lead data into STELLAR for children under the age of six and case management and risk assessment activities for children with an EBL $\geq$ 10 µg/dl. Data sharing and analysis were key components of the contract with the City Health Department. As part of the collaborative partnership between these entities, DHSS provided geocoding of EBLs in the city. DHSS staff identified "hotspots" in several areas of the city and these hotspots were overlaid onto neighborhood boundaries to obtain a picture of EBLs in St. Louis.

Detoxification crews in St. Louis noted that many of the EBL "hotspots" were located in areas of the city with significant numbers of building demolitions. City health staff wanted to determine if a correlation existed between elevated childhood blood lead levels and building demolitions and requested the assistance of DHSS. Working closely with the City of St. Louis Department of Health, DHSS obtained databases for vacant buildings and building and demolition permits from the City of St. Louis Building Division. Demolitions occurring in 2001 and 2002 were geocoded. The location of the demolitions were compared to EBL "hotspots" during the same time period. This initial investigation identified several areas in the city where the two overlapped. Looking for more in depth analysis of the data, both DHSS and the City of St. Louis Department of Health staff agreed to forward the results of this initial study to Tulane University for further analysis.

While Tulane University was conducting the demolition study, DHSS staff continued to strengthen their partnership with the City of St. Louis. DHSS staff commented on the *Lead Safe St. Louis* initiative unveiled by the city. The plan was intended to result in significant reductions in lead levels in city children and make as many city-housing units as lead safe as possible. The overall goal of the initiative was to comply with the Healthy People 2010 goal of eradicating lead poisoning as a public health concern by 2010. The initiative included several work groups to address lead poisoning issues that staff from DHSS, City of St. Louis Department of Health and Building Division serve on, in addition to other agency staff in the community and interested volunteers. As part of outreach efforts, a meeting at the DHSS Eastern District Office with representatives from the U.S. Environmental Protection Agency (EPA), Agency for Toxic Substances and Disease Registry (ATSDR), Missouri Department of Natural Resources, City of St. Louis Department of Health and the City of St Louis Planning and Urban Design Department was held to discuss joint activities.

In December 2004, study collaborators from DHSS and Tulane University met with representatives of the City of St. Louis to present the study results. Those in attendance agreed that the study complemented the *Lead Safe St. Louis* initiative. They determined that the findings would serve as a baseline for evaluating the current efforts by the City of St. Louis to eliminate childhood lead poisoning. DHSS and Tulane staff members agreed

to continue working closely with the City of St. Louis to conduct additional analysis of the data if deemed necessary.

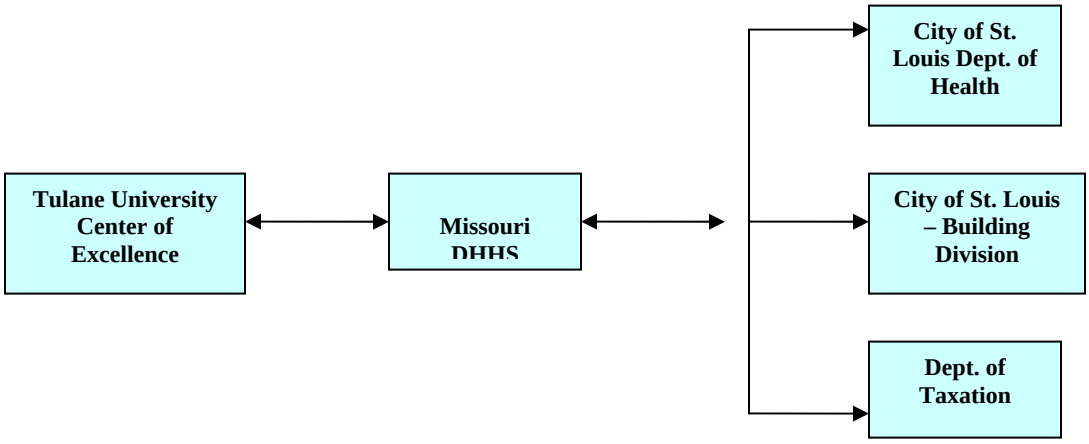

Fig. 1: EPHTN Partnerships

V. Lessons Learned and Recommendations

Academic/state partnerships provide a unique opportunity to advance public health research. Benefits of such partnerships are achieved through access to and use of unique data sources and the increased probability of the translation of findings into public health practice. Both of these are discussed in more detail below.

Data issues

A principal feature of the EPHTN is the idea that existing and/or routinely collected data sources, generally collected for regulatory purposes, should be assimilated for the purpose of tracking environmental quality and health conditions. This secondary use of data requires detailed documentation of each pertinent dataset to ensure that the data are interpreted and used properly. In the absence of such documentation, open relationships with the data stewards is an important goal, so that questions that arise during use of the data can be addressed. Discussions of data quality and limitations should be carefully noted and discussed to assure that appropriate information is conveyed to partnering agencies and the public.

During this project, researchers at Tulane identified several issues for which answers were not readily available within the data documentation. These included issues related to geocoding and identifying the geographic location of relevant structures, assigning age of structures, determining the definition of certain data elements (need for a data dictionary), and identification of dataset characteristics for which metadata would have been useful. Given the limited availability of complete documentation, Tulane researchers benefited from an on-going, open line of communication with Missouri DHSS personnel who, if they did not have the answer, could easily find it. This underscores the importance of maintaining an enduring relationship with data stewards,

and regarding them as partners in the project rather than simply as a gateway to data access. Overall, the datasets proved to be quite usable and complete and correct data were available for most variables. This suggests that effective merging of datasets from different data sources is possible and the environmental public health tracking network has the potential to extend to other environmental health areas.

Translation of findings

Translation of research findings into public health practice is the goal of public health research. Translation of findings is more likely to occur when research is relevant to the mission of practitioners at public health agencies. Although academic-based research is an important part of the scientific process, translating research findings into the fabric of public health has proven difficult. We have found that findings from research conducted with the meaningful contribution of public health practioners in both the design and implementation phase of the project have a greater chance of being utilized than if the research had been conducted in an academic vacuum.

Throughout this project, Tulane, DHSS and the City of St. Louis Department of Health were able to discuss research design, data acquisition and quality issues and the results of the research project. At the end of the project, a practical intervention of increasing the number and frequency of inspections of demolition sites by the St. Louis City Building Division has led to increased awareness of potential hazards and a tangible public health initiative. In addition, those involved with the project were able to develop and maintain relationships with researchers and public health practitioners, which will be beneficial as we develop new and innovative approaches to data linkage, analysis and meaningful public health interventions where resources are limited.

VI. Conclusion

Public health practitioners and academic researchers bring unique approaches to public health. Integrating these approaches and the unique assets of each entity leads to a more comprehensive way of addressing public health issues. There are many elements to a successful partnership. An element that is essential is a shared commitment to applied public health research and a funding structure that supports and rewards such partnerships. An example of such a structure is the CDC EPHTN. Common barriers to the development of effective practitioner-researcher partnerships are largely related to achieving "buy-in" from both parties related to motivation, identification of roles and responsibilities, defining goals, and overcoming institutional cultural differences. The collaboration between Missouri DHSS and Tulane University to evaluate the impact between housing demolitions and children's blood lead levels demonstrates the positive impact achievable when these barriers are overcome.

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